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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/895,524	06/28/2001	Rafael A. Mena	TI-29612	8193

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TEXAS INSTRUMENTS INCORPORATED
P O BOX 655474, M/S 3999
DALLAS, TX 75265

EXAMINER

FOONG, SUK SAN

ART UNIT PAPER NUMBER

2823

DATE MAILED: 08/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/895,524

Applicant(s)

MENA ET AL.

Examiner

Suk-San Foong

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 May 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. Claim 2 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
2. Claim 2, it is questioned what is recited through the use of “on the order of”.

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
5. Claims 1, 3, 5 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in combination with Ngo et al. ('263) and Yao et al. ('564).

AAPA is relied on for the teachings discussed in the rejections of paragraph 8 of the Office Action mailed on 12/20/02.

AAPA does not disclose forming liner layer through HDP (high density plasma) with a portion of the liner layer over metal leads having sloped edges.

Ngo et al. teaches a method of forming a semiconductor device which includes providing metal lead 42 (Col. 4, lines 50-56, and Fig. 4), then forming HDP liner layer 50 comprised of oxide over substrate 40 and metal lead 42 wherein a portion of HDP liner layer 50 over metal lead 42 (Col. 4, lines 61-63, Col. 5, lines 8-12, and Fig. 5), and then forming a dielectric layer over HDP liner layer 50 (Col. 5, lines 12-16).

It would have been within the scope to one ordinary skill in the art to combine both teachings because it would enable formation of liner 14 of AAPA to be performed.

With respect to claim 5, the portion of HDP liner layer formed over the metal leads would inherently have a pyramid (or triangular) shape because HDP deposition process results in such a surface topology as disclosed in Yao et al. (Col. 1, lines 18-23).

6. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in combination with Ngo et al. ('263) and Yao et al. ('564) as applied to claims 1, 3, 5 and 12 above.

The combination process does not disclose that the sloped edges have a slope on the order of 45°.

The choice of thickness of gate electrode material would have been a matter of routine optimization to achieve the desired device density on the finished wafer and the desired device

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characteristics of the device to be formed; as discussed in paragraph 9 of the Office Action mailed on 12/20/02.

7. Claims 4 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in combination with Ngo et al. ('263) and Yao et al. ('564) as applied to claims 1, 3, 5 and 12 above, and further in view of Shields ('850).

The combination process does not disclose that the dielectric layer is comprised of silane based oxide.

Shields is relied on for the teachings discussed in the rejections of paragraph 10 of the Office Action mailed on 12/20/02 as providing motivation to enable the formation of dielectric layer 16 and gap-fill layer 16 of AAPA to be performed.

8. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in combination with Ngo et al. ('263) and Yao et al. ('564) as applied to claims 1, 3, 5 and 12 above, and further in view of Bothra et al. ('102).

The combination process does not disclose the step recited in claim 6.

Bothra et al. is relied on for the teachings discussed in the rejections of paragraph 11 of the Office Action mailed on 12/20/02 as providing motivation to enable the formation of liner layer 14 of the combination process to be performed.

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9. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in combination with Ngo et al. ('263) and Yao et al. ('564) as applied to claims 1, 3, 5 and 12 above.

The combination process does not disclose the step recited in claim 7.

The choice of etch-to-deposition ratio in forming HDP liner layer would have been a matter of routine optimization to achieve the desired profile given the width and spacing of the metal lines; in view of the disclosure of Kelkar ('367, see Abstract); as discussed in paragraph 12 of the Office Action mailed on 12/20/02.

10. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in combination with Ngo et al. ('263) and Yao et al. ('564) as applied to claims 1, 3, 5 and 12 above, and further in view of Aug et al. ('644).

The combination process does not disclose that the HDP liner layer is comprised of undoped silicon dioxide.

Aug et al. is relied on for the teachings discussed in the rejections of paragraph 13 of the Office Action mailed on 12/20/02 as providing motivation to enable the formation of liner layer 14 of the combination process to be performed.

11. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in combination with Ngo et al. ('263) and Yao et al. ('564) as applied to claims 1, 3, 5 and 12 above, and further in view of Tsai et al. ('394).

The combination process does not disclose that the HDP liner layer is comprised of fluorinated HDP oxide.

Tsai et al. is relied on for the teachings discussed in the rejections of paragraph 14 of the Office Action mailed on 12/20/02 as providing motivation to enable the formation of liner layer 14 of the combination process to be performed.

12. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in combination with Ngo et al. ('263) and Yao et al. ('564) as applied to claims 1, 3, 5 and 12 above, and further in view of Wolf.

The combination process does not disclose that the HDP liner layer is comprised of phosphorus HDP oxide.

Wolf is relied on for the teachings discussed in the rejections of paragraph 15 of the Office Action mailed on 12/20/02 as providing motivation to enable the formation of liner layer 14 of the combination process to be performed.

Response to Arguments

13. Applicant has failed to establish that the term "on the order of" has been defined in the instant specification, has a well-established meaning in the art or has a well-established meaning in the common usage such that it is clear what range of is recited. It is suggested that the term be replaced with--about--to make clear that the recited difference is not on order of magnitude (power of 10).

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14. Applicant's arguments with respect to claim 1 and claims dependent thereon have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

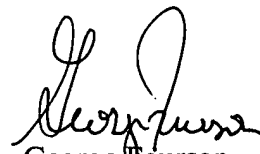
15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Chang et al. ('152) teaches forming HDP intermetal dielectric layer over conductive leads. Lee ('380) forms HDP oxide layer over metallization leads and metal fuse structure. Tsai ('379) teaches forming intermetal dielectric layer 44 over metal layer 42 with a triangular profile by HDP process and then depositing oxide layer over intermetal dielectric layer 44.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Suk-San Foong whose telephone number is 703-305-0383. The examiner can normally be reached on Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 (7724, 3431, 3432).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

sk
August 19, 2003


George Fourson
Primary Examiner
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